

REMARKS

Applicant believes that the combined teachings of *Hatfield et al.* (Journal of Plastic Film & Sheeting), *Canham et al.* (U.S. Pat. Appl. Pub. No. 20030120001), *Erderly et al.* (U.S. Pat. No. 5,451,450), and Applicant's "Background of Invention" cannot make claims 1-19 obvious for the reason that follows.

I. Teachings of *Hatfield et al.*, *Erderly et al.*, and *Canham et al.*

a) *Hatfield et al.*

Hatfield et al. teaches an MDO (machine direction orientation) method. More particularly, *Hatfield et al.* teaches the use of a process aid (a long chain carboxylic acid) to increase the draw ratio of a MMW-HDPE (medium molecular weight, high density polyethylene) film during MDO. According to *Hatfield et al.*, the process aid is used because "[m]any HDPEs need to be drawn at relatively high draw ratios before they evenly without stretch resonance." *See reference page 118, the second last sentence of third paragraph.*

With the process aid, *Hatfield et al.* achieved a maximum draw ratio of only 8:1. *See reference Table 2, page 122.* *Hatfield et al.* explains why a higher draw ratio cannot be usually reached: "The problem is that the film typically breaks while passing through the stretch resonance region before reaching these draw ratios or the film will not orient at the high draw ratio." *See reference page 118, the last sentence of third paragraph.*

b) *Erderly et al.*

Erderly et al. teaches an elastic film. In the "Summary of the Invention", *Erderly et al.* describes its invention as a method for producing an elastic film. *See col. 2, line 55.* In the "Detailed Description of the Invention, Introduction", *Erderly et al.* states: "The present invention is directed an elastic film" *See col. 3, lines 5-6.*

More particularly, in the “Detailed Description of the Invention, Production of the Resins”, *Erderly et al.* states: “Generally the elastomer can be any of the group consisting of plastomer, styrene-butadiene copolymer, polychloroprene (neoprene), nitrile rubber, butyl rubber, polysulfide rubber (Thiokol), cis-1,4-polyisoprene, ethylene-propylene co or terpolymers (EPR and EPDM rubber), silicone rubber and polyurethane rubber or blends of them with other polymers.” *See col. 3, lines 21-31.*

c) ***Canham et al.***

In general, *Canham et al.* teaches a polymerization process, rather than the machine direction orientation of polyethylene films. *See paragraph 0001.* Nevertheless, in paragraphs 0178 and 0179, *Canham et al.* states that a polyethylene film produced by the process may have 1% secant modulus greater than 800 MPa. *See page 3, lines 1-2, the Office Action.*

In summary, the above three references teach, respectively,

Hatfield et al.: using a process aid in MDO of a MMW-HDPE film to increase the draw ratio to a disclosed maximum value of 8:1 and to achieve an MDO film having a disclosed maximum 1% secant MD modulus of 401,620 psi;

Erderly et al.: an elastic film (but not a polyethylene film) that can be stretched at a drawdown ratio of 10:1 to 30:1; and

Canham et al.: a polyethylene film having a 1% secant modulus of 800 MPa or greater.

II. Combined Teachings of *Hatfield et al.*, *Erderly et al.*, and *Canham et al.* Cannot Make Claims 1-19 Obvious under 35 U.S.C. §103(a)

The Examiner rejects claim 1-19 over the above discussed three references for obviousness under 35 U.S.C. § 103(a). The Examiner gives various reasons for the rejections of the claims. Accordingly, Applicant responds to each of the rejections as follows.

a) Claim 1

The Examiner rejects claim 1 over *Hatfield et al.* in view of *Erderly et al.* and *Canham et al.* Applicant respectfully rebuts the Examiner's rejection of claim 1 for the following reasons.

As the Examiner recognizes, *Hatfield et al.* not only fails to teach or suggest orienting a polyethylene film in the machine direction at a draw-down ratio greater than 10:1 but also fails to teach or suggest that an MDO method can produce an oriented film having a 1% secant MD modulus of 1,000,000 psi or greater. The question here is whether the secondary references, *Erderly et al.*, *Canham et al.*, or a combination thereof, can provide the necessary remedies for the defects of *Hatfield et al.* Applicant's answer is "no."

First, *Erderly et al.* cannot provide any remedy for *Hatfield et al.*'s defects. As discussed above, *Erderly et al.* teaches only an elastic film. There is no surprise that *Erderly et al.* is able to stretch an elastic film to a draw ratio of 10:1 to 60:1 because elastomers, by nature, have very low modulus and high elasticity. Unlike an elastic film, a polyethylene film "typically breaks while passing through the stretch resonance region before reaching these draw ratios or the film will not orient at the high draw ratio." See the last sentence, Discussion, page 118, *Hatfield et al.* Therefore, *Erderly et al.* would not have taught or suggested to a person having ordinary skill in the art that a polyethylene film taught by *Hatfield et al.* can also be oriented to a draw-down ratio greater than 10:1 and that by doing so an MD oriented film having a 1% secant MD modulus of 1,000,000 psi or greater can be achieved.

Nor can *Canham et al.* provide any remedy to the defects of *Hatfield et al.* The Examiner relies on *Canham et al.* for its teaching of a polyethylene film having 1% secant modulus greater than 800 MPa. Note that 800 MPa equals to only 116,030 psi. Therefore, *Canham et al.* cannot teach or suggest to a person having ordinary skill in the art that an MDO method can achieve an MD oriented film having a 1% secant MD modulus of 1,000,000 psi or greater.

Finally, Applicant cannot see any possible combination of *Erderly et al.* and *Canham et al.* that would provide any necessary remedy to the defects of *Hatfield et al.*

In conclusion, claim 1 is not obvious over *Hatfield et al.* in view *Erderly et al.*, *Canham et al.* or a combination thereof.

b) Claims 2-19

Claims 2-19 are not obvious because these claims depend from claim 1 and they therefore incorporate all limitations of claim 1.

More specifically, in the rejection of claim 15, the Examiner points out that *Canham et al.* teaches an oriented film having a 1% secant MD modulus of 1,100,000 psi or greater. Applicant believes that the Examiner simply erred in converting the units from MPa to psi. As discussed above, *Canham et al.* in paragraph 179 teaches a film that has a modulus of 800 MPa and 800 MPa equals to only 116,030 psi, rather than 1,100,000 psi.

Similarly, the Examiner's rejection of claim 2 is also based on the same mistaken conversion as in the rejection of claim 15.

In the rejection of claims 3-9, the Examiner uses Applicant's "Background of the Invention" which discusses the definitions of HDPE, MDPE, LDPE and LLDPE, and high molecular polyethylene. Note that claims 3-9 depend from claim 1, and therefore these claims do not simply define the polyethylene resins,

but they further define the method of claim 1, which is a method for orienting a polyethylene film in the machine direction to produce an oriented film having high MD modulus.

Similarly, in the rejection of claims 10-13, the Examiner cites the Sigma-Aldrich product catalog for the listed number average molecular weights. Again, please note that claims 10-13 depend from claim 1. These dependent claims thus further define the method of claim 1.

Finally, claims 16-19 also depend from claim 1. As discussed above, claim 1 is patentable; its dependant claims 16-19 are therefore patentable.

In summary, Applicant respectfully requests that the Examiner withdraw the rejections and allow remaining claims 1-19. Applicant invites the Examiner to telephone their attorney, Shao-Hua Guo, at (610) 359-6059 if a discussion of the application might be helpful.

Respectfully submitted,
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June 27, 2006

Customer Number: 24114